



Study of Damage on Tocklai Vegetatives TV1, TV6 and TV10 by Red Spider Mite *Oligonychus Coffeae* Nietner

Dr. Maitrayee Dutta

Maryam Ajmal Women's College of Science and Technology, Hojai, PIN-782435

ABSTRACT

Three Tocklai vegetatives TV1, TV6 and TV10 were studied to know the damage made by *Oligonychus coffeae* Nietner. Per cent leaf area damage measured by a portable leaf area meter LI COR-3000 showed that highest damage was made by *O. coffeae* in TV1 (92.68 %) followed by TV10 (81.944 %) and TV6 (79.528 %). The hatching percentage and fecundity of TV1 also showed positive correlations with fecundity ($r = 0.83574^{**}$) and hatching percentage ($r = 0.69839^{**}$) of *O. coffeae*.

KEYWORDS

Damage, *Oligonychus coffeae*, red spider mite, tea

Introduction

Red spider mite *Oligonychus coffeae* Nietner belonging to the family Tetranychidae is one of the most devastating pests of tea plantations of India causing a great deal of damage and cause economic loss in the Indian tea industry. It is a perennial pest which invades the tea monoculture habitat. Chronicled among the 12 species of perennial pests they are arachnids closely related to ticks and spiders. They damage plants by lacerating cell sap from the matured upper leaf tissue (Das, 1959; Gupta 1985; Muraleedharan, 1992; Hajra, 2001; Haque, 2007) as in the older leaves the cells are flaccid and the flow of sap is slow which allows red spider mite to attack more (Harrison, 1938). The damage is observed as definite flecks and streaks of reddish colour followed by desiccation and eventually appreciable defoliation on older leaves which gradually spreads to the younger leaves injuring them to die. The red spider mites have a typical life cycle and breed at an alarming rate within a short time span during favourable conditions of hot dry seasons. Hence, they are very difficult to eradicate. They mostly lay eggs at dawn and dusk and due to their multiple generations in a year has a considerable propensity for developing resistance to miticide. In North-East India it is reported that it is an important pest causing a decap in the tea economy (Das, 1959). But prior to taking any effective control measure the knowledge of the extend of damage is necessary. The present work was designed to study the damage caused by *O. coffeae* on three different Tocklai Vegetative (TV) clones .

Materials and Methods

To study the per cent leaf infestation or leaf damage three matured fourth leaf of Tocklai Vegetative clones TV1, TV6 and TV10 were taken. Their area was measured with the help of a portable leaf are meter, Model LI-COR 3000. The "detached leaf culture" method of Helle and Sabellis, 1985 modified by Hazarika *et al.* (1995) and Saikia *et al.* (1999) was adopted for this study. Fifteen adult females were released on each leaf and allowed to feed for a duration of 8 days. The infested area was removed and the leaf area was measured again. The area consumed per female per day was determined.

Results and Discussion

Significant differences observed from the investigations made on per cent leaf area damage (PLAD) of matured fourth leaf of tea by *O. coffeae* are presented on Table 1. Clonal plants of TV1 was more susceptible with 92.68±2.704 % leaf area damage compared to TV10 with 81.944±0.706 % leaf area damage and TV6 with 79.528±0.916% leaf area damage. Thus the highest damage was made by *O. coffeae* in TV1 followed by moderate damage in TV10 and lowest damage in TV6. These findings are in conformity with research findings of Saikia (1999) who reported that the highest damage

in TV1 from various tea pests is due to monoculture habitat. This was also extensively agreed upon by various workers (Thirugnanasuntharan, 1990; Mukhopadhyay *et al.*, 2001; Pathak 2004). This experiment also found the significant effect of fecundity and hatching percentage on the three TV clones and the extent of damage caused on the clones. Correlation studies presented on Table 2. showed that % leaf area damage ($r = 0.83574^{**}$), leaf thickness ($r = -0.56881^*$) and leaf area ($r = -0.83310^{**}$) was positively correlated with fecundity of *O. coffeae*. Similarly % leaf area damage ($r = 0.69839^{**}$), leaf thickness ($r = -0.68149^{**}$) and leaf area ($r = -0.80299^{**}$) was also positively correlated with % hatching of *O. coffeae*. Fig.1 and Fig. 2 shows the regression graph of per cent leaf area damage by *O. coffeae* on TV clones with fecundity and hatching which further elaborates the extend of damage. The magnitude of % leaf area damage with fecundity is expressed by the equation $y = -24.703 + 1.1532x$ and that of per cent hatching is expressed as $y = -30.944 + 1.2147x$. Table 3. shows maximum fecundity in TV1 (82.47±2.69), followed by TV10 (72.57±2.58) and minimum in TV6 (63.93±8.98). The hatching percentage was also observed to be greatest in TV1 (83.19±4.65) followed by TV10 (66.96±4.60) and the mite seems to cause the lowest percentage of hatching in TV6 (65.74±3.27). The results on Table 1. also show that leaf thickness was greatest in TV6 (46.2±12.050) followed by TV10 (39.2±1.095) and TV1 (37±2.739). This finding corroborates other workers as thickness of leaf may provide lower resistance as lower feeding was observed in thick TV6 leaves and thick cuticle may impart protection from herbivory (Hanna *et al.*, 1982). Hence, in this study the leaf area was the largest in TV6 (0.730±0.075), followed by TV10 (0.665±0.061) and smallest in TV1 (0.466±0.038) and showed that *O. coffeae* preferred TV1 with the smallest leaf area for laying eggs and increased hatchability for causing the highest damage.

"Table 1 over here

Table 1. Comparison of certain physical leaf characters amongst the three TV clones

Clones Physical characters (mean±SD)	Leaf thickness (mm)	Leaf area (dm ²)	Leaf area damage (%)
TV1	37±2.739	0.466±0.038	92.68±2.704
TV6	46.2±12.050	0.730±0.075	79.528±0.916
TV10	39.2±1.095	0.665±0.061	81.944±0.706
S.Ed	4.530	0.0268	1.074
CD _{0.05}	NS	0.0549	2.340
CD _{0.01}	NS	0.074	3.280

Table 2 over here

Table 2. Correlation of biological characters of *O. coffeae* on various morphological characters of leaf of TV clones

Correlation coefficient		
Morphological characters	Fecundity	% Hatching
% leaf area damage	r = 0.83574**	r = 0.69839**
Leaf thickness	r = -0.56881*	r = -0.68149**
Leaf area	r = -0.83310**	r = -80299**

** indicates significance at 1% level

* indicates significance at 5% level

r = correlation coefficient

Table 3 over here

Table 3. Effect of TV clones on certain reproductive characteristics of *O. coffeae*

Reproductive characters (Mean±SD)	TV1	TV6	TV10	SEd	CD _{0.05}	CD _{0.01}
Fecundity (no. of eggs/female)	82.47±2.69	63.93±8.98	72.57±2.58	1.821	3.694	4.982
Percent hatching (%)	83.19±4.65	65.74±3.27	66.96±4.60	3.255	6.602	8.903

Fig 1 over here

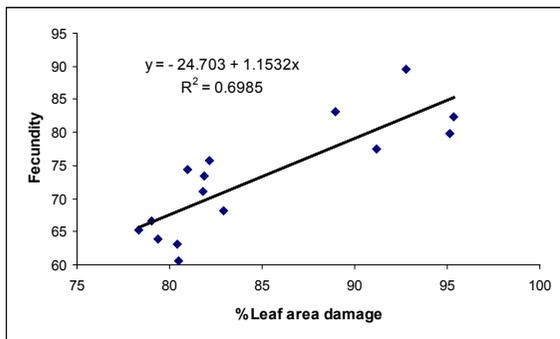


Fig. 1. Relationship between feeding (% leaf area damage) and fecundity of *O. coffeae*

Fig 2 over here

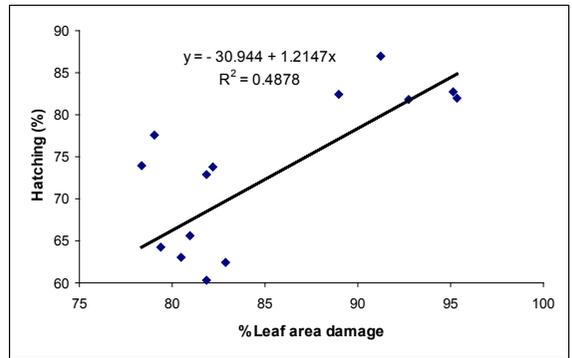


Fig. 2. Relationship between feeding (% leaf area damage) and hatching of *O. coffeae*

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